APPLICATION NO. 09/846,410

TITLE OF INVENTION: Multiple Data Rate Hybrid Walsh Codes for CDMA

INVENTOR: Urbain A. von der Embse

Currently amended Claims

APPLICATION NO. 09/846.410

TITLE OF INVENTION: Multiple Data Rate ~~Complex~~ Hybrid Walsh Codes for CDMA

INVENTOR~~S~~: Urbain A. von der Embse

CLAIMS

WHAT IS CLAIMED IS:

Claim 1. (cancelled)

Claim 3. (cancelled)

Claim 3. (cancelled)

Claim 4. (cancelled)

Claim 5. (currently amended) A method to generate ~~for the design and implementation of fast encoders and fast decoders for~~ Hybrid Walsh and generalized Hybrid Walsh ~~complex orthogonal~~ CDMA channelization codes for multiple data rate users, ~~over a frequency band with properties~~said method comprising:

means for generating orthogonal Hybrid Walsh inphase (real axis) codes and quadrature (imaginary axis) codes ~~are defined~~ by lexicographic reordering permutations of the Walsh code,

means for generating lexicographic permutations from the ~~Hybrid Walsh codes have a~~ 1-to-1 sequency~frequency, ~~correspondence with the DFT codes and have a 1-to-1~~ even~cosine, and odd~sine correspondences with the DFT codes,

means for constructing Hybrid Walsh codes ~~take~~ with values {1+j, -1+j, -1-j, 1-j} or equivalently ~~take values~~ {1, j, -1, -j} with $j=\sqrt{(-1)}$, ~~a (-45) rotation of axes and a renormalization~~

means for constructing generalized Hybrid Walsh orthogonal and quasi-orthogonal codes ~~can be constructed for a wide range of code lengths~~ by combining Hybrid Walsh, Walsh, ~~with~~ DFT (discrete Fourier transform), Hadamard, ~~and other orthogonal codes, and~~ quasi-orthogonal PN (pseudo noise), and the plurality of other codes using tensor (Kronecker) product, direct product, and functional combining,

~~fast encoding and fast decoding implementation algorithms are defined~~

~~algorithms are defined to~~ means for mapping multiple data rate user data symbols onto the code input data symbol vector, and~~for fast encoding and the inverses of these algorithms are defined for recovery of the data symbols with fast decoding~~

means for performing fast encoding and decoding.

~~encoders perform complex multiply encoding of complex data to replace the current Walsh real multiply encoding of inphase and quadrature data~~

~~decoders perform complex conjugate transpose multiply decoding of complex data to replace the current Walsh real multiply decoding of inphase and quadrature data~~

Claim 6. (currently amended) A method to generate ~~for the design and implementation of encoders and decoders for~~ complex ~~orthogonal~~ CDMA and generalized complex ~~orthogonal~~ CDMA channelization codes for multiple data rate users ~~over a frequency band with properties~~said method comprising:

means for generating orthogonal complex codes inphase (real axis) codes and quadrature (imaginary axis) codes ~~are defined~~ by reordering permutations of the real Walsh codes,

means for constructing orthogonal and quasi-orthogonal generalized complex codes ~~can be constructed for a wide range of code lengths by combining the complex codes with~~ from DFT, ~~(discrete Fourier transform),~~ Hybrid Walsh, Walsh, Hadamard, ~~and other orthogonal codes, and~~ quasi-orthogonal PN, ~~codes~~and the plurality of other codes using tensor product, direct product, and functional combining,

~~fast encoding and fast decoding implementation algorithms are defined~~

~~algorithms are defined to~~ means for mapping multiple data rate user data symbols onto the code input data symbol vector, and ~~for fast encoding and the inverses of these algorithms are defined for recovery of the data symbols with fast decoding~~

means for performing fast encoding and decoding.

~~encoders perform complex multiply encoding of complex data to replace the current Walsh real multiply encoding of inphase and quadrature data~~

~~decoders perform complex conjugate transpose multiply decoding of complex data to replace the current Walsh real multiply decoding of inphase and quadrature data~~

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Clean version of how the Claims will read.

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TITLE OF INVENTION: Multiple Data Rate Hybrid Walsh Codes for CDMA

INVENTOR: Urbain A. von der Embse

CLAIMS

WHAT IS CLAIMED IS:

Claim 1. (cancelled)

Claim 3. (cancelled)

Claim 3. (cancelled)

Claim 4. (cancelled)

Claim 5. (currently amended) A method to generate Hybrid Walsh and generalized Hybrid Walsh CDMA channelization codes for multiple data rate users, said method comprising:

means for generating orthogonal Hybrid Walsh inphase (real axis) codes and quadrature (imaginary axis) codes by lexicographic reordering permutations of the Walsh code,

means for generating lexicographic permutations from the 1-to-1 sequency~frequency, even~cosine, and odd~sine correspondences with the DFT codes,

means for constructing Hybrid Walsh codes with values {1+j, -1+j, -1-j, 1-j} or equivalently {1, j, -1, -j} with $j=\sqrt{(-1)}$,

means for constructing generalized Hybrid Walsh orthogonal and quasi-orthogonal codes by combining Hybrid Walsh, Walsh, DFT (discrete Fourier transform), Hadamard, quasi-orthogonal PN (pseudo noise), and the plurality of other codes using tensor (Kronecker) product, direct product, and functional combining,

means for mapping multiple data rate user data symbols onto the code input data symbol vector, and

means for performing fast encoding and decoding.

Claim 6 (currently amended) A method to generate complex CDMA and generalized complex CDMA channelization codes for multiple data rate users, said method comprising:

means for generating orthogonal complex codes inphase (real axis) codes and quadrature (imaginary axis) codes by reordering permutations of the real Walsh codes,

means for constructing orthogonal and quasi-orthogonal generalized complex codes from DFT, Hybrid Walsh, Walsh, Hadamard, quasi-orthogonal PN, and the plurality of other codes using tensor product, direct product, and functional combining,

means for mapping multiple data rate user data symbols onto the code input data symbol vector, and

means for performing fast encoding and decoding.